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Application Number	09/929,426
Filing Date	August 13, 2001
First Named Inventor	Stephen F. Gass
Art Unit	3724
Examiner Name	Jason D. Prone
Attorney Docket Number	SDT 301

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- ☐ Certified Copy of Priority Document(s)
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- ☐ Drawing(s)
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Remarks

Appellant has reinstated an appeal. The fee for the Appeal Brief was paid in the prior appeal and should be applied to this appeal pursuant to MPEP 1204.01 and 1207.04.

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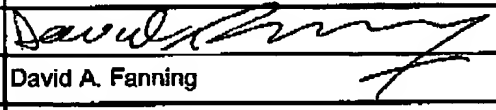
Signature			
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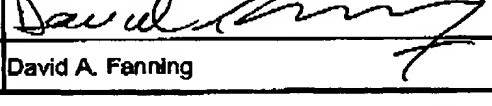
Signature			
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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of

Date: October 2, 2006

STEPHEN F. GASS, ROBERT L. CHAMBERLAIN, BENJAMIN B. SCHRAMM, JOEL F. JENSEN and JONATHAN N. BETTS-LACROIX

Serial No.: 09/929,426

Examiner Jason D. Prone

Filed: August 13, 2001

Group Art Unit 3724

For: DETECTION SYSTEM FOR POWER EQUIPMENT

To: Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450

APPEAL BRIEF

1. Real Party in Interest.

The real party in interest is SD3, LLC, the assignee of the above-identified application. SD3 is a privately owned Oregon limited liability company.

2. Related Appeals and Interferences.

All other known prior and pending appeals, interferences or judicial proceedings which may be related to, directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal are listed below. These appeals are listed because SD3, LLC is the real party in interest and the appeals relate to various aspects of safety systems for power equipment.

1. Appeal of application serial number 09/929,238 (fully briefed).
2. Appeal of application serial number 10/053,390 (fully briefed).
3. Appeal of application serial number 10/100,211 (fully briefed).

4. Appeal of application serial number 10/189,027 (appeal brief filed, awaiting examiner's answer).
5. Appeal of application serial number 11/098,984 (appeal brief filed, awaiting examiner's answer).
6. Appeal of application serial number 10/146,527 (appeal brief due November 19, 2006).
7. Appeal of application serial number 10/172,553 (appeal brief due November 15, 2006).

Applicant has also filed appeals in applications 09/929,221, 09/929,227, 09/929,240, 09/929,242, 09/929,425, 10/189,031, 10/243,042 and 10/292,607, but those applications have either been allowed, returned to the examiner, or prosecution has been re-opened. Applicant identifies these prior appeals because the applications involved may be related to the present application.

3. Status of Claims.

The application was filed with claims 1-25. Claim 3 is allowed. Claims 1, 2 and 4-7 were finally rejected in an office action mailed May 1, 2006. Claims 8-25 have been cancelled. The appealed claims are claims 1, 2 and 4-7.

This is the second time an appeal brief has been filed in this application. The first appeal brief was filed March 18, 2005 and the examiner responded to that brief by re-opening prosecution and asserting new grounds of rejection.

4. Status of Amendments.

All amendments have been entered.

5. Summary of Claimed Subject Matter.

The claims involved in this appeal describe a woodworking machine with a new safety system designed to detect contact between a person and a cutter and to trigger some predetermined action if contact is detected. The contact detection system is adapted to distinguish contact with a person from contact with other items so that the predetermined action is not triggered unnecessarily. One embodiment of the woodworking machine is a table saw that detects when a person accidentally contacts the spinning blade and then stops and/or retracts the blade to minimize any injury. The table saw distinguishes contact with a person from contact with green or wet wood so that the reaction system does not trigger when cutting the wood. Table saws embodying this technology are currently being sold under the name SawStop and already those saws have saved the hands or fingers of at least 80 different people who had accidents while using the saws.[1] Those people likely would have suffered life-changing lacerations or amputations if they had been working on non-SawStop saws. The claims involved in this appeal describe machines such as these table saws.

The machine of claim 1 includes a conductive cutter adapted to cut a workpiece (such as cutter 40 in Figure 2), and a motor adapted to drive the cutter. A contact detection system (such as detection subsystem 22 in Fig. 1) imparts an electrical signal to the cutter and the electrical signal has at least one property that changes when a person contacts the cutter. If a person contacts the cutter, then a reaction system (such

[1] SawStop saws are made and sold by SawStop, LLC, a wholly-owned subsidiary of applicant SD3, LLC. Pictures and videos of SawStop saws can be seen on the Internet at www.sawstop.com.

as reaction system 24 in Fig. 1) causes a predetermined action to take place. (Embodiments of various contact detection systems are shown in Figures 5-17 and discussed on pages 11-31 of the submitted specification and in paragraphs 40-84 of the published application. An exemplary change in signal property that occurred when an actual finger contacted the blade of a table saw is shown in Fig. 7.)

Claim 1, the only independent claim involved in this appeal, specifies that the contact detection system is adapted to distinguish contact between a person and the cutter from at least one other event generating a comparable amount of change in the relevant property of the electrical signal based on the time during which the change in the property occurs. For example, green wood may cause the signal property to change because it is somewhat conductive, but the change occurs slower than if the blade contacts a person. Thus, in this example, the contact detection system would distinguish between cutting green wood and cutting a person by looking at the time during which the signal property changed. (This is discussed at various locations in the specification, including pages 23:15 to 26:15 and pages 29:10 to 30:19 of the submitted specification, and paragraphs 65-71 and 79-82 of the published application.)

Claims 2 and 4-7 all depend from claim 1, either directly or indirectly. Claim 2 further recites that the signal property is voltage amplitude. Claim 4 recites that the time during which the change in the signal property occurs is less than one millisecond, and claim 5 recites that the change occurs in less than 100 microseconds. Claim 6 recites that the event which generates a comparable amount of change in the signal property is contact between the cutter and green wood. Claim 7 recites that the predetermined action includes stopping the movement of the cutter.

6. Grounds of Rejection to be Reviewed on Appeal.

The grounds of rejection presented for review are:

1. Are claims 1, 2, 4, 5 and 7 obvious under 35 USC 103(a) in light of U.S. Patent No. 4,117,752 to Yoneda combined with U.S. Patent No. 5,081,406 to Hughes?

2. Is claim 6 obvious under 35 USC 103(a) in light of Yoneda combined with Hughes and U.S. Patent 6,366,099 to Reddi?

7. Argument.

I. Claims 1, 2 and 7.

Claims 1, 2 and 7 stand rejected under 35 U.S.C. §103(a) in light of Yoneda (Patent 4,117,752) combined with Hughes (Patent 5,081,406). The Board should reverse that rejection because the cited references fail to disclose or suggest all the limitations of the claims and an obviousness rejection cannot stand unless all claim limitations are taught or suggested. See, e.g., 35 USC 103(a) (question is whether "the subject matter as a whole would have been obvious"); Application of Royka, 490 F.2d 981, 985 (CCPA 1974) (claim not obvious because limitation missing from cited references); Application of Wilson, 424 F.2d 1382, 1385 (CCPA 1970) ("All words in a claim must be considered in judging the patentability of that claim against the prior art."); MPEP 2143.03 ("To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.")

Claims 1, 2 and 7 describe a woodworking machine having a cutter, a motor to drive the cutter, and a contact detection system to detect when a person contacts the cutter. The contact detection system is electrically coupled to the cutter to impart an electrical signal to the cutter. The electrical signal has at least one property and that

property changes when a person contacts the cutter because a human body is conductive and has capacitance (i.e., it can store electrical charge). The contact detection system detects contact between a person and the cutter by looking for a pertinent change in the signal property. If the contact detection system sees the change, a reaction system causes a predetermined action to take place.

The claims further specify that "the contact detection system is adapted to distinguish contact between the cutter and the person from at least one other event generating a comparable amount of change in the at least one property based on the time during which the change in the at least one property occurs." This limitation addresses the fact that a woodworker may need to cut a workpiece that could cause the signal property to change in an amount comparable to when a person contacts the cutter. For example, some green or wet wood could affect the signal property because the moisture in the wood increases the dielectric constant and conductivity of the wood. If the moisture content is high enough, then the signal property could change in an amount comparable to when a person contacts the cutter. This change, however, occurs more slowly than when a person contacts the cutter because it depends on the amount of green or wet wood adjacent the cutter and it takes many milliseconds for the wood to go from not touching to surrounding the cutter. Claims 1, 2 and 7 recite systems that make use of this difference by specifying that the contact detection system is adapted to distinguish human contact from other events based on the time during which the change in the signal property occurs. Without this claimed feature, the contact detection system could interpret contact between green wood and the cutter as contact with a person, and the reaction system could then cause the predetermined action to

take place unnecessarily. If the reaction system triggers unnecessarily, then the usability of the saw would be diminished.

One embodiment of a contact detection system as described in claim 1 is shown in Figures 5-15 of applicant's specification. That embodiment makes use of a gain control system including an amplifier 101 that drives an electric signal (the drive signal) onto plate 44. The drive signal induces a corresponding signal (the sense signal) on plate 46 through blade 40. A micro-controller 171 is programmed to adjust the drive signal up or down to maintain the desired sense signal on plate 46. In this embodiment, the controller is capable of skewing the drive signal at a maximum rate of about 10% per millisecond. When cutting green wood, the sense signal may drop, but if it does, it drops at a rate which the controller can match and the controller would then ramp up the drive signal to keep the sense signal at the desired level. If a person contacts the blade, however, the sense signal will drop faster than the controller can match and the reaction system will trigger the predetermined action. In this manner, the contact detection system distinguishes contact between the cutter and the person from contact with green wood based on the time during which the change in the signal occurs (This system is discussed on pages 23-25 of the submitted specification and in paragraphs 65-68 of the published specification.)

Another embodiment of the claimed contact detection system is shown in Figures 14-18 of applicant's specification. In that embodiment, the sense signal on plate 46 is fed into a sense amplifier 190 and the output of the sense amplifier is fed into a level detector. The level detector generates a DC output proportional to the amplitude of the sense amplifier. The output of the level detector is then fed into a differentiator and

the differentiator generates an output proportional to the rate of change of the sense amplifier output amplitude. The sense amplifier output changes quickly when a person touches the blade, but changes relatively slowly when cutting green wood, and the differentiator is tuned to respond to the quicker change but not the slower. The output of the differentiator is then fed to a comparator that acts as a threshold detector. When the output of the differentiator has reached a predetermined level indicative of contact with a person, the threshold detector signals the controller and the reaction system triggers the predetermined action. In this embodiment, the contact detection system uses a differentiator to distinguish contact between the cutter and the person from contact with green wood based on the time during which the change in the signal occurs. (This system is discussed in the published specification at paragraphs 79-82.)

The limitation in claims 1, 2 and 7 requiring a contact detection system adapted to differentiate contact based on the time during which a signal change occurs distinguishes the claims from the cited references. Yoneda discloses "an emergency system for stopping an endless band blade of cutting apparatus immediately when part of the human body comes into contact with the band blade." (Yoneda, column 1, lines 5-8.) But Yoneda fails to teach or suggest any system to detect a time rate of change of a signal property. Instead, Yoneda discloses a system that detects the electric charge potential of the human body. (Yoneda, column 1, lines 40-45.) The examiner recognizes this point and therefore cites Hughes as purportedly showing a system that detects the time rate of change of a signal. (Final Office Action mailed 5/1/06, p. 3.)

Hughes, however, does not teach or suggest such a system. In fact, Hughes does not even discuss distinguishing contact based on the time rate of change of a

signal property. Instead, Hughes discloses a system to detect amplitude and amplitude changes. Whether Hughes discloses a system to detect the time rate of change of a signal is the main point of disagreement between applicant and the examiner.

Hughes discloses "a body capacitance responsive system and method for protecting the operators of potentially dangerous equipment, such as electrical power saws." (Hughes, column 1, lines 12-15.) The Hughes system uses "a band pass resistance-inductance-capacitance (RLC) tunable filter circuit 10 which is connected to receive a driving signal from an RF signal source 12 and is further connected as shown through a coaxial cable 14 and an antenna 16 to a saw blade 18." (Hughes, column 3, lines 4-9.) The RLC circuit produces an output signal "to activate safety equipment for controlling and stopping the motion of the moving part substantially instantaneously." (Hughes, abstract.) Hughes explicitly says his system is based on amplitude changes. For example, Hughes explains: "Since the RF signal source 12 directly feeds the RLC network 10, the output signal from this network is an amplitude modulated carrier signal which varies in amplitude in response to body capacitance-produced dynamic changes in the capacitance dynamically coupled to the antenna 16." (Hughes, column 4, lines 27-32.) Thus, the system disclosed by Hughes detects amplitude and amplitude changes, not the time rate of change of a signal property.

Nevertheless, the examiner says Table A in the Hughes reference shows a time rate of change, and therefore, it would have been obvious to provide Yoneda with a contact detection system to distinguish work pieces based on the time rate of change of a signal property. (Final Office Action mailed 5/1/06, p. 3). The examiner, however, is mistaken because Table A makes no reference to rates of change; it simply lists voltage

amplitudes produced by various materials, as shown by the copy of Table A reproduced below:

TABLE A

Effects of Materials on Antenna Capacitance
Various materials were cut into 4 inch by 6 inch sections to approximate the dimensions of the human hand. All materials were .75 inches thick with the exception of the 6062 aluminum which was .062 inches thick. Each item was placed one inch from the sensing antenna (4 inch face dimension parallel to the antenna) while the shift in DC voltage at TP-1 (wideband test) was measured.

Material	Volts	Normalized Modulation (%)
Human Hand	5.5	100.0
	Common Woods	
Alder	0.38	6.9
Oak	0.38	6.9
Particle Board	0.31	5.6
Pine	0.34	6.2
Redwood	0.32	5.8
	Metals	
Aluminum (6062 alloy)	0.89	16.0
	Other Materials	
Styrofoam	0.02	0.36
Plexiglass	0.20	3.6

Table A lists voltage amplitudes because Hughes' system is based on amplitude changes, as explained above. By listing only voltage amplitudes, Table A confirms that the Hughes system detects changes in amplitude and not the rates at which those amplitudes change.

Because claims 1, 2 and 7 recite a contact detection system that distinguishes contact with a person from some other event "based on the time during which the change in the at least one property occurs," and because the references cited by the examiner fail to disclose any such system, the obviousness rejection cannot stand. See, e.g., 35 USC 103(a) (question is whether "the subject matter as a whole would have

been obvious"); Application of Royka, 490 F.2d 981, 985 (CCPA 1974) (claim not obvious because limitation missing from cited references); Application of Wilson, 424 F.2d 1382, 1385 (CCPA 1970) ("All words in a claim must be considered in judging the patentability of that claim against the prior art."); MPEP 2143.03 ("To establish *prima facie* obviousness of a claimed invention, all the claim limitations must be taught or suggested by the prior art.") This is an independent reason why the obviousness rejection of claims 1, 2 and 7 should be reversed.

Another independent reason why the obviousness rejection of claims 1, 2 and 7 should be reversed is because there is no suggestion to combine Yoneda and Hughes. The examiner proffered the following suggestion to make the combination: "Therefore, it would have been obvious to one of ordinary skill in the art, at the time of the invention, to have provided Yoneda with a contact detection system capable of distinguishing between different work pieces and the human body, as taught by Hughes et al., to allow the saw to determine if the material contacting the blade is to be cut or not." (Final Office Action mailed 5/1/06, p. 3.) The examiner's reasoning, however, does not make sense because Yoneda already discloses a system that purportedly distinguishes contact with a person from contact with wood; that is the whole point of Yoneda's disclosure. Why would a person of ordinary skill in the art want to change Yoneda's system if that system already does what the examiner says is the reason to change? Nothing in Yoneda suggests that its system has any problem distinguishing between work pieces and the human body, so where in the prior art does the examiner find that suggestion? It seems that the examiner's suggestion is simply a rote invocation made to support the obviousness rejection. It does not amount to a suggestion or motivation

found in the prior art to make the claimed combination because it fails to identify any specific understanding or scientific principle suggesting the combination. See In re Rouffet, 149 F.3d 1350, 1355, 47 USPQ2d 1453 (Fed. Cir. 1998); In re Dembiczak, 175 F.3d 994, 999, 50 USPQ2d 1614, 1617 (Fed. Cir. 1999) (citations omitted), *abrogated on other grounds* in In re Gartside, 203 F.3d 1305, 53 USPQ2d 1769 (Fed. Cir. 2000).

II. Claims 4 and 5.

Claims 4 and 5 stand rejected as obvious under 35 U.S.C. §103(a) in light of Yoneda combined with Hughes. Claims 4 and 5 depend from claim 1 and are not obvious for the same reasons claim 1 is not obvious. Claim 4 also says the "time during which the change in the at least one property occurs is less than one millisecond," and claim 5 says the "time during which the change in the at least one property occurs is less than one hundred microseconds." The examiner rejected these claims because Yoneda says its system stops a band blade "immediately," and "immediately," according to the examiner, qualifies as one millisecond or 100 microseconds. (Final Office Action mailed 5/1/06, p. 2.)

The Board should reverse this rejection because the examiner is confusing Yoneda's statement of how long it takes to stop the movement of the band blade with applicant's claim limitation concerning the time rate of change of a signal. Those are two different things. Clearly, Yoneda's use of the word "immediately" refers to stopping the band blade, not the time rate of change of a signal, and therefore, the examiner's rejection of claims 4 and 5 is unfounded.[2]

[2] Appellant also points out that Yoneda cannot stop a band blade within 1 millisecond or 100 microseconds because of the inertia of the blade, pulleys and motor, and therefore,

III. Claim 6.

Claim 6 stands rejected as obvious under 35 U.S.C. §103(a) in light of Yoneda and Hughes combined with Reddi (U.S. Patent 6,366,099). Claim 6 depends from claim 1 and is not obvious for the same reasons claim 1 is not obvious. Claim 6 also says the event distinguished from contact between a person and the cutter is "contact between the cutter and green wood."

The examiner rejected claim 6 by saying Reddi discloses a capacitance-measuring circuit able to detect both a human hand and the moisture content of wood, and that it would have been obvious to provide Yoneda and Hughes with "the ability of distinguishing between cutter/human contact and cutter/green wood contact, as taught by Reddi." (Final Office Action mailed 5/1/06, p. 4.)[3] The examiner's rejection, however, misses the point. The question is not whether Reddi's system can distinguish human contact from contact with green wood, but rather whether Reddi discloses a system to distinguish those contacts *based on the time rate of change of a signal property*. That is what claim 6 recites, and Reddi does not disclose or suggest such a system. Reddi discloses a system to measure the difference between capacitances, not the rate of

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the word "immediately" as used by Yoneda cannot refer to 1 millisecond or 100 microseconds.

[3] The examiner cited column 3, lines 15 and 20 in Reddi as support for his statement that Reddi teaches a system to detect a human hand and the moisture content of wood. Those lines, however, are from the section in Reddi describing the prior art, they do not describe Reddi's system. Reddi's system focuses on a capacitance sampler with greater sensitivity and enhanced noise performance. (Reddi, column 3, line 33 to column 4, line 13.)

change of capacitances. (Reddi, column 3, lines 33-42). Accordingly, the combination of Yoneda, Hughes and Reddi cannot render claim 6 obvious.

8. Claims Appendix.

1. A woodworking machine comprising:

a conductive cutter adapted to cut a workpiece;

a motor adapted to drive the cutter;

a contact detection system electrically coupled to the cutter to impart an electrical signal thereto, where the electrical signal has at least one property, and where the at least one property is changed when a person contacts the cutter, and where the contact detection system is adapted to distinguish contact between the cutter and the person from at least one other event generating a comparable amount of change in the at least one property based on the time during which the change in the at least one property occurs; and

a reaction system adapted to cause a predetermined action to take place upon detection of contact between the person and the cutter by the contact detection system.

2. The machine of claim 1, where the at least one property is the voltage amplitude of the electrical signal.

4. The machine of claim 1, where the time during which the change in the at least one property occurs is less than one millisecond.

5. The machine of claim 1, where the time during which the change in the at least one property occurs is less than one hundred microseconds.

6. The machine of claim 1, where the at least one other event is contact between the cutter and green wood.

7. The machine of claim 1, where the predetermined action includes stopping movement of the cutter.

9. Evidence Appendix.

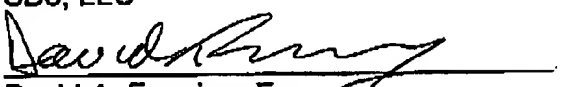
None.

10. Related Proceedings Appendix.

None.

Respectfully submitted,

SD3, LLC



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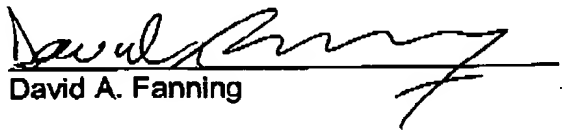

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